[0080] FIG. **12** is a view illustrating a configuration of a display system.

[0081] Referring to FIG. **12**, a display system **200** may include a display panel **110**, a pipe **150**, a light emitter **160**, an energy storage portion **210**, and a processor **220**.

[0082] The light emitter **160** is a component configured to emit light for displaying an image on the display panel **110** and may generate heat.

[0083] The electrodes **170** are provided in the pipe and may be polarized.

[0084] The pipe **150** may be a component positioned adjacent to the light emitter **160** and have a conductive fluid and a gas therein, wherein, heat is generated to move the conductive fluid inside the pipe **150** when the light emitter **160** emits light, and electricity is generated while the conductive fluid moves and passes around the electrodes.

[0085] The energy storage portion **210** may store electrical energy.

[0086] Here, the energy storage portion **210** may be a power circuit, a super capacitor, or a battery, but the energy storage portion **210** is not limited thereto.

[0087] The processor **220** may store the electricity generated in the pipe **150** in the energy storage portion **210**.

[0088] In addition, the processor **220** may use the electrical energy stored in the energy storage portion **210** as energy for driving the display panel **110**. For example, the electrical energy stored in the energy storage portion **210** may be used as standby power of the display device **100**, but the processor **220** is not limited thereto and may be variously used for driving the display device **100**.

[0089] FIG. **13** is a view for describing a method of energy harvesting in the display system.

[0090] As power is supplied to the display device **100** (power-on) and the light emitter **160** emits light, evaporators of the pipe **150** are heated to increase a pressure thereof and a conductive fluid and gas positioned in evaporator regions of the pipe **150** move to condenser regions of the pipe **150** in which temperatures are relatively low.

[0091] Here, the conductive fluid passes electricity generator regions positioned between the evaporators and condensers of the pipe **150**, and, at this point, generates electrical energy while passing between the polarized electrodes **170**.

[0092] The electrical energy generated in this manner is stored in the energy storage portion **210** and may be used for driving and operating the display device **100**. For example, the stored electrical energy may be used as standby power of the display device **100**, but the stored electrical energy is not limited thereto.

[0093] The condensers of the pipe **150** may phase-shift a gas around the condensers into a liquid. In this process, the conductive fluid and the gas in the pipe **150** circulate in the pipe **150** having the form of a closed loop.

[0094] That is, in the disclosed disclosure, since a phase-shift of the conductive fluid occurs due to the heat transferred from the light emitter **160**, the fluid moves and generates kinetic energy due to a pressure difference generated by the above-described phase-shift, and thus electricity may be generated even with no additional input source from the outside.

[0095] Here, since an inside of the pipe **150** is in the vacuum state, a boiling temperature of the fluid in the pipe is relatively low, and thus the conductive fluid may be moved by being heated only by the light emitter **160** such as an LED.

[0096] In addition, to improve speed of the conductive fluid, an amount of heat input from the light emitter **160** may be adjusted to be greater. Accordingly, the heat dissipation performance of the display device **100** may be improved. In addition, when the speed of the conductive fluid is increased, an amount of generated electrical energy is increased, and thus a power generating capacity may also be improved.

[0097] FIGS. **14** to **16** are views illustrating one embodiment of a shape of a pipe.

[0098] Referring to FIGS. **2** and **14** to **16**, when there are a plurality of light emitters **160** and a plurality of pipes **150**, the plurality of light emitters **160** are formed at each of both sides of the main body **101**, the plurality of pipes **150** are positioned to match each of the light emitters **160** of the both sides thereof, and evaporators may be adjacent to the light emitters **160**.

[0099] As illustrated in FIGS. **2** and **14** to **16**, the pipe **150** may be formed in the form of a closed loop of any one of a spiral, a polygon, a circle, a zigzag, or a combination thereof.

[0100] FIGS. **17** to **20** are views illustrating another embodiment of a shape of a pipe.

[0101] As illustrated in FIGS. **17** to **20**, when a light emitter **160** is formed at one or the other side surface of a main body **101**, a pipe **150** may be positioned so that evaporators are adjacent to the light emitter **160** formed at one side or the other side surface of the main body **101**.

[0102] Here, the pipe **150** may be formed to have a size which covers a front surface of the main body **101** (see FIG. **17**) or may be formed to have a size which covers a part of the front surface of the main body **101** (see FIGS. **18** to **20**).

[0103] FIG. **21** is a view illustrating still another embodiment of a shape of a pipe.

[0104] When there are a plurality of light emitters **160***a*, **160***b*, **160***c*, and **160***d* and a plurality of pipes **150***a*, **150***b*, **150***c*, and **150***d*, the plurality of light emitters **160***a*, **160***b*, **160***c*, and **160***d* may be disposed on a front surface of a main body **101** in the form of a plurality of rows.

[0105] In addition, the plurality of pipes **150***a*, **150***b*, **150***c*, and **150***d* may be positioned so that evaporators are adjacent to each of the light emitters **160***a*, **160***b*, **160***c*, and **160***d* disposed in the form of a plurality of rows, respectively.

[0106] Since the pipes of the disclosed disclosure may be positioned to extend on the front surface or a part of a surface of the main body **101**, it is expected to have an advantage of improving a strength of the display device in addition to effects of the above-described heat dissipation performance and energy harvesting.

[0107] As is apparent from the above description, since a pipe configured to generate electrical energy by circulating an internal conductive fluid through a heat source is provided in a display device, effects in which energy can be harvested by using kinetic energy of the fluid while simultaneously improving a heat dissipation performance can be expected.

[0108] In addition, since electrical energy is variously used for driving the display device, such as, using the electrical energy for standby power of the display device, an effect in which energy efficiency is improved can be expected.